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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.	
10/561,912	03/23/2007	Graham Eastham	31229-226445	1376	
26694	7590	09/02/2009	EXAMINER		
VENABLE LLP		WITHERSPOON, SIKARL A			
P.O. BOX 34385		ART UNIT		PAPER NUMBER	
WASHINGTON, DC 20043-9998		1621			
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/561,912	EASTHAM ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	Sikarl A. Witherspoon	1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 05 May 2009.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-55,58,60 and 62-65 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1,2,4-41,44-47,51-55,58,60 and 62-65 is/are rejected.  
 7) Claim(s) 3,42,43 and 48-50 is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/26/09</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application |
|  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

The examiner has considered the amendment filed by applicants on May 5, 2009 and the arguments therein. The amendment was not effective in placing the claims in condition for allowance and applicants' arguments were not found persuasive. As such, the following rejections have been maintained.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 58 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iverson et al (Organometallics, 2001).

The instant claims are respectively drawn to a hydroformylation catalyst system comprising a bidentate compound, and a Group VIII metal, and to a hydroformylation reaction medium comprising said catalyst and a solvent, each of which comprising hydrogen as per applicants' amendment.

Iverson et al teach a catalyst complex comprising rhodium chloride and a bidentate ligand (compound 2, p 5746) and a reaction medium comprising said catalyst and a chlorine-containing solvent (scheme 4, p 5748).

The differences between Iverson et al and the instant claims are that the ligand taught by Iverson et al contains a methylene bridging group between phosphorus

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atoms, while the instant claims require at least a two carbon group, i.e. an ethylene group; also, the reference does not teach a hydroformylation reaction.

However, the examiner contends that it would have been obvious to a person having ordinary skill in the art to expand the bridging group in the ligand taught by Iverson et al, by increasing the number of carbon atoms in and effort to find other ligands that can combine with rhodium to form catalyst complexes that would optimize the alkyne addition reaction taught by Iverson et al. The preamble, or the fact that the instant claims refer to a hydroformylation catalyst and a hydroformylation reaction system has not been given much patentable weight. The catalyst and reaction medium taught by Iverson et al renders the instant claims obvious.

The examiner does not find the presence of hydrogen in the instant claims to be a patentable distinction. It is well-known in the art that the catalyst complex taught by Iverson et al may be employed in other reactions, including, inter alia, hydroformylation reactions. It would have been obvious that if said catalyst complex is used in a hydroformylation reaction, then hydrogen would be present.

Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hofmann et al (Journal of Organometallic Chemistry, 1995).

Hofmann et al teach bis(di-t-butylphosphino) methane complexes of rhodium for use in an alkyne hydrosilation reaction.

The differences between Hofmann et al and the instant claim are that the ligand taught by Hofmann et al contains a methylene bridging group between phosphorus

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atoms, while the instant claims require at least a two carbon group, i.e. an ethylene group; also, the reference does not teach a hydroformylation reaction, and thus, does not teach the presence of hydrogen.

However, the examiner contends that it would have been obvious to a person having ordinary skill in the art to expand the bridging group in the ligand taught by Hofmann et al, by increasing the number of carbon atoms in and effort to find other ligands that can combine with rhodium to form catalyst complexes that would optimize the alkyne hydrosilation reaction taught by Hofmann et al. The preamble, or the fact that the instant claim refers to a hydroformylation catalyst has not been given much patentable weight. The catalyst taught by Hofmann et al renders the instant claim obvious. The examiner does not find the presence of hydrogen in the instant claims to be a patentable distinction. It is well-known in the art that the catalyst complex taught by Hofmann et al may be employed in other reactions, including, *inter alia*, hydroformylation reactions. It would have been obvious that if said catalyst complex is used in a hydroformylation reaction, then hydrogen would be present.

Claims 1, 2, 4-41, 44-47, 51-55, and 60 and 62-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breikss et al (US 5,710,344) and Eastham et al (US 6,335,471) in combination.

The claims are drawn to a process for hydroformylation of an olefin in the presence of a catalyst system comprising a Group VIII metal compound, a bidentate

phosphine, and wherein a chlorine moiety is present in said Group VIII metal compound and/or in the solvent.

Breikss et al teach a process for preparing linear aldehydes by the hydroformylation of an ethylenically unsaturated organic compound in the presence of a catalyst comprising a Group VIII metal and a bidentate phosphorus ligand (abstract). The reaction temperature and pressure overlap the parameters recited in the instant claims (col. 7, lines 20 to 47).

The primary difference between Breikss et al and the instant claims is that Breikss et al do not teach the same bidentate ligand recited in the instant claims. However, Eastham et al teach bidentate phosphine ligands that have a general formula that encompasses the ligand(s) recited in the instant claims. The reference teaches that the phosphine compounds are useful as a component of a catalyst system in the carbonylation of olefins (col. 1, lines 6 to 64).

In view of the combined reference teachings, it would have been obvious to a person having ordinary skill in the art to include the bidentate ligands taught by Eastham et al as possible alternatives to the bidentate ligands taught by Breikss et al in order to experiment and find the best metal-ligand combination that affords optimum selectivity to linear aldehydes in the process taught by Breikss et al.

### ***Response to Arguments***

Applicant's arguments filed May 5, 2009 have been fully considered but they are not persuasive. With regard to the rejection of claims 1, 2, 4-41, 44-47, 51-55, 60 and

62-65, the thrust of applicants' arguments are that Eastham et al do not teach ligands according to the present invention where R is an alkylene group, and since Eastham et al do not expressly teach hydroformylation reactions, it would not have been obvious to a person having ordinary skill in the art that the essentially infinite possibility of ligands taught by Eastham et al would have reasonably been expected to produce predictable results in the hydroformylation reaction taught by Breikss et al.

The examiner respectfully disagrees with applicants' arguments. First, the examiner would like to point out that Eastham et al actually do teach a ligand wherein the bridging group corresponding to "R" is an alkylene group. For example, Eastham et al teach that the compound, bis (di-tert-butyl phosphino)-o-xylene is a ligand according to their invention (see col. 2, line 43). This ligand has a methylene group as the bridging group.

Regarding the use of the ligands taught by Eastham et al in the process taught by Breikss et al, it has been shown in the art that the substituents on bulky bisphosphine ligands may have an effect on the linear: iso ratio of products in a hydroformylation reaction. While it is true that Eastham et al do not expressly teach a hydroformylation reaction, the reference teaches that the ligands disclosed therein are useful in carbonylation reactions; hydroformylation is one type of carbonylation reaction. The examiner is of the opinion that the artisan, seeking to find a catalyst system comprising a Group VIII metal and a bidentate organic ligand, would have at least found it obvious to try out, or experiment with some of the ligands taught by Eastham et al in lieu of, or along with some of the ligands taught by Breikss et al, to find a catalyst complex that

affords optimal selectivity to linear products. While the ligands taught by Eastham et al may be selected from a potentially infinite set of possibilities, as suggested by applicants, Eastham et al does actually list several specific ligands that may be used. And again, while Eastham et al teaches carbonylation in generally, the prior art is replete with examples of catalysts complexes comprising a Group VIII metal and an organic ligand that are used in carbonylation reactions (with hydrogen), and hydroformylation reactions as well (hydrogen is present). The examiner there contends that the rejection is proper.

### ***Claim Objections***

Claims 3, 42, 43, and 48-50 are objected to as being dependent upon a rejected base claim.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikarl A. Witherspoon whose telephone number is 571-272-0649. The examiner can normally be reached on M-F 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel Sullivan can be reached on 571-272-0779. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sikarl A. Witherspoon/  
Primary Examiner, Art Unit 1621